P-244 - EXPLORING BARREL AGED BEER HETEROGENEITY USING VOLATILE FINGERPRINTING

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Background
Several beer styles involve barrel ageing, where transformations occur involving extraction of wood compounds, oxidative reactions and metabolism of wild microorganisms populating the barrel. Thus, there is high variability and heterogeneity in chemical composition and sensory profile of the final product. This work explores global volatile fingerprinting as a tool to assess heterogeneity in different beers aged through different methods. The potential of this tool was explored in the characterization and establishment of correlations between ageing methodology and final product composition.

Method
Six beers were aged in Port wine barrels. Three beers were fermented in inox VATs and aged in barrel, one during 16 months and two other during 11 months. The other three beers were fermented and aged in the barrel during 3 months, two were pitched with S. cerevisiae and the other fermented by wild barrel microbes. For comparison one unaged control was also analyzed. For volatile fingerprinting minor volatiles in beer samples were retrieved by dicloromethane microextraction and analyzed by GC-MS. PCA was performed accompanied by cluster analysis of variable loadings regarding to the main components extracted, which led to the final volatile fingerprints and correlations.

Results & Conclusions
A scatterplot with 3 dimensions correlating samples and volatiles was outlined. Control unaged beer was mainly correlated with isoamyl acetate and was near the cluster of both beers fermented in barrel with S. cerevisiae inoculum, which correlated with z-2-penten-1-ol content. Beers fermented in inox VATs and aged during 11 months were found in another cluster, correlating with ethyl octanoate, ethyl butyrate and 2-phenylethyl acetate, as well as whiskey lactone. Mainly correlating with typical Brettanomyces metabolites 4-ethylphenol and 4-ethylguaiacol, beer fermented by wild barrel microbes comprised another cluster, correlating also with 2-ethyl-1-hexanol and ethyl 2-methylbutyrate. Finally, beer fermented in inox VAT and aged during the longest time period was the one correlating with a higher number of volatiles, implying a higher sensory complexity. In its cluster compounds such as tyrosol, ethyl lactate and 4-methyl-1-pentanol could be found. Overall, volatile fingerprinting of beers was a suitable tool to assess beer characteristics, similar beer were found in similar clusters and correlations with volatiles were coherent with the production methods.

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